Fungicide timing and products for efficient management of Swiss needlecast (*Phaeocryptopus gäumannii*) on Douglas-fir (*Pseudotsuga menziesii*).

Brian Eshenaur and Elizabeth Lamb New York State Integrated Pest Management Program, Cornell University Extension, Geneva & Ithaca NY

Abstract:
Douglas firs have been an important part of NY Christmas tree and Nursery Production. Recently they have fallen out of favor due primarily to the perceived need to spray several times in the spring to prevent a needlecast disease. However, there is strong evidence to show that Douglas firs can be grown without many of the sprays currently being applied. With reduced spray requirements, the Douglas fir would be a viable option to grow and contribute to diversity among the evergreen plantings that are important for a robust industry. Through research and extension, this project is demonstrating that Douglas fir can be grown successfully with fewer sprays and possibly with fungicide with lower environmental impacts.

Project Justification:
Evergreen tree farming on nurseries and Christmas tree farms is a multi-million-dollar industry in temperate regions of the U.S.; providing trees for decoration and live specimens for transplant. In the most recent USDA Census of Agriculture, NYS is seventh in the U.S. for Christmas tree producers (844 farms) and total trees harvested (348,043 trees); with an estimated farmgate and consumer retail value of $8.8 and $14.2 million, respectively. Douglas fir trees are adaptable to various soil conditions, are relatively quick growers and over the last 20 years contributed to the success of the Christmas tree industry in New York. However, some Christmas tree farmers in NY and elsewhere in the Northeast have moved away from Douglas fir because of the requirements for fungicide applications to manage needlecast diseases. Other growers continue to plant Douglas fir due to it's resistant to deer damage and tolerance to warmer climates that can be found in the lower Hudson Valley and Long Island.
Based on our 2016Springwater NY research results we learned that timing of the spray greatly affects the efficacy of the treatment. We also found that repeated weekly applications did not yield greater control than a single well-timed spray.
In 2017 we came to the conclusion that growers who are able to achieve good spray coverage should be able to reduce the number of sprays to if they entirely bypass the early sprays and wait until the average length of new growth is approximately 4cm when the first application is made.
In 2018 we were looking at the efficacy of fungicides in comparison to the industry standard, Chlorothalonil.

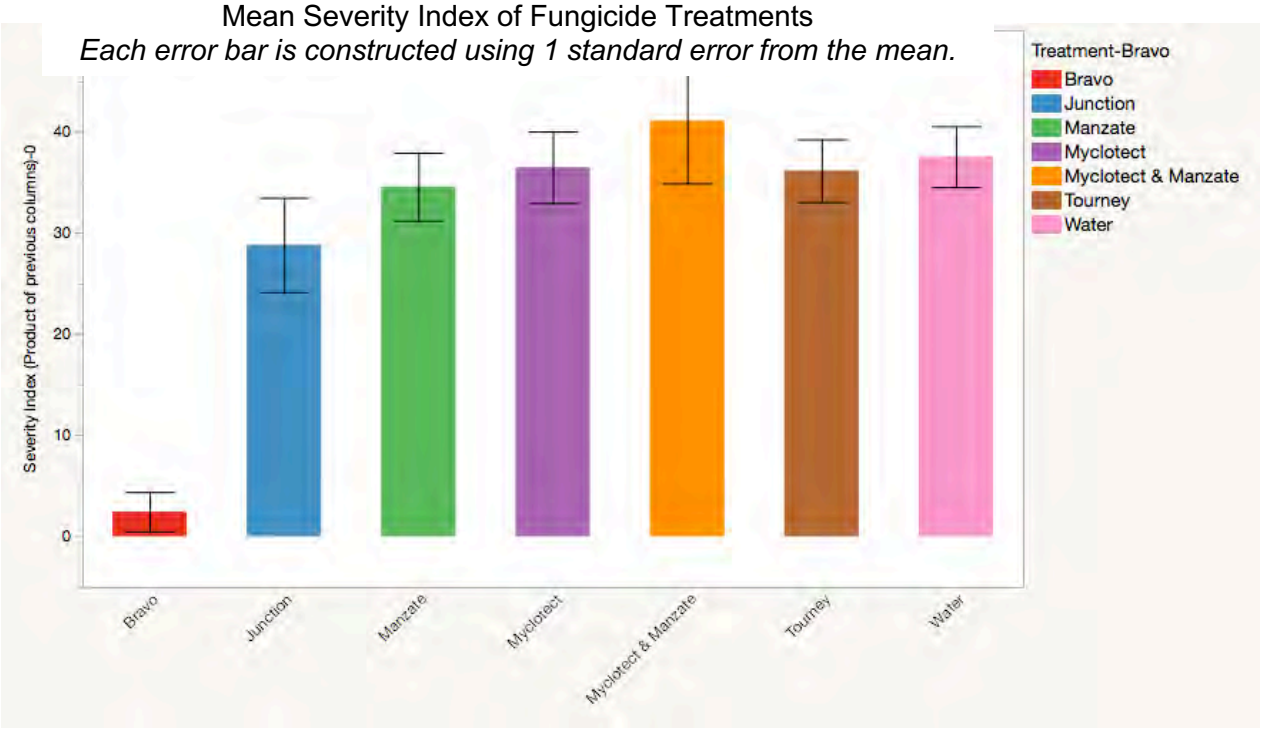
Procedures
Treatment fungicides were applied at average of 4 cm shoot elongation Cholrothalonil (Bravo), Junction, Manzate, Mycoltect, combination of previous two, Tourney and water control. A total of 14 trees were treated. Each tree received all 7 treatments on tagged branches. One rep. of seven trees received two applications.

Newly emerged Douglas-fir foliage.

Study tree with tagged branches receiving different fungicide treatments.

Rating Protocols
Rating method supplied by Gary Chastagner, 2014. Samples are collected and assessments are made in early spring (Approx. 11 months after treatments are made).
Incidence: (% Neeldles on a shoot that are infected) of Swiss Needle Cast (SCN) pseudothecia on needles is rated on a simple 0-10 scale where 0 = none, 1 = 1-10%....10=91-100% of the needles on the sample have pseudothecia.
Pseudothecia Density: *(Of those needles that are infected how much of the needle's area is encompassed by pseudothecia).* A shoot a severity rating is calculated based on the % of the area of that needle that is covered in pseudothecia.
Severity Index: Product of above two ratings. Analysis of variance was completed on Severity index.

Results & Discussion



Fungicide result on the disease severity index based on a single fungicide application.

Based on this single treatment protocol the fungicide Bravo containing the active ingredient Chlorothalonil was the most effective. A poster with these results was presented at the Kanuga national workshop for pests of ornamental crops.
This spring, we will collect the data for the 2018 treatments in which we trialed at a new foliar product along with further honing the optimum timing for the applications of cholrothalonil.

Chlorothalonil alternative? In late fall of 2018 at our grower cooperator Douglas-fir field site in Springwater, NY we initiated a study designed to assess the effectiveness of a soil applied systemic fungicide treatment. If this regime provides control for needlecast diseases it may provide an option with a lower environmental impact compared to the standard fungicide treatments. Permits and season-end reports were submitted to the DEC approval of the experimental use of this fungicide not currently registered for the treatment of tree diseases. We will collect data from these treated trees and untreated control trees in the spring of 2019 and 2020.